long, soon elongates until it acquires a nearly square form, which it retains.

This mode of multiplication appears interesting, as it seems to show the solvent action exerted by proteic substances upon cellulose membrane and the part which they play in its regeneration, phænomena which, as may be seen, are not without analogy with those observable during the evolution of spores, pollen, &c. Another fact worthy of remark is, that in these formations the generation of the cells extends to all those contiguous to the parent cell of the stomate.—*Comptes Rendus*, 17th April, 1854, p. 744.

Description of a new Genus of Bivalve Mollusca. By H. and A. Adams.

Genus Myrina, H. and A. Adams.

Shell transverse, oblong, subequilateral; valves closed, covered with a horny epidermis, pearly within; beaks subcentral. Hinge edentulous, ligament internal, linear; muscular impressions far apart, pallial impression simple. Byssiferous.

A single species, for which we propose the name *M. Denhami*, was discovered by the Officers of H.M.S. Herald, attached to floating masses of blubber.

On the Dimorphism of the Uredineæ. By M. Tulasne.

Since numerous observations have placed it beyond a doubt that a vast number of *Fungi* possess reproductive bodies of several kinds, there is in the history of the *Uredineæ* a fact, which, I think, admits of a more satisfactory interpretation than it has hitherto received. I refer to the simultaneous presence or succession in the same sori of two sorts of fruits (spores), which are attributed to different species. Some mycologists see in this nothing but a cohabitation, which, although frequent, is by no means necessary; others suppose a compulsory relation between the two Uredines,—that of a parasite with its host. If the latter opinion prevailed, instead of four or five *Phragmidia* and a few *Pucciniæ*, which would be parasitic upon various *Uredines*, as is usually believed, we should have, as I have convinced myself, a multitude of other *Pucciniæ*, the *Uromyces*, the *Pilulariæ*, the *Triphragmia*, the *Coleosporia*, the *Melampsoræ*, the *Cronartia*, and no doubt many other *Uredineæ* which I have not yet been able to study sufficiently. Thus the *Uredineæ* would not only live, as is really the case, as parasites upon the vascular plants, but they would also offer among themselves an example of parasitism quite unknown in the history of organized bodies, as about a third of their species would be charged with the nourishment of another third. This parasitism would also present a very unprecedented character, for it would prevail between plants almost identical with each other, or at all events united by the closest affinities, whilst, even amongst the simplest beings, there are generally well-characterized organic differences between the parasite and its host. The parasitic life attributed to the *Phragmidia*, the *Pucciniæ*, the *Cronartia*, and other *Uredineæ*, in relation to the *Uredines* proper, is therefore *à*

priori extremely improbable. Direct observation does not appear to me to render it at all more probable, for the productions in question are often met with quite independently of each other. As to those who only see in the *Uredines* and their hosts, associations or cohabitations comparable to those of the various grasses which compose our meadows, they perhaps will not recognize the importance of the phænomenon in question, and may misunderstand its signification. Against them they have the often striking resemblance between the *Uredo* and the Fungus which is united with it, and especially the constant order of their respective appearance, the *Uredo* always preceding its companion. This resemblance and succession evidently indicate relations between the productions which present them, and as these relations cannot be those of parasitism, they may be with more probability regarded as the indications of specific identities, which were suspected by some old observers, but which have been universally neglected by the mycologists of the present day. In truth, there is scarcely room to hope that we shall ever be able to furnish a direct proof of this identity, or one obtained by sowing, in consequence of the almost insurmountable difficulties attending the culture of Fungi, and especially that of the *Entophyta*; but even if the supposed proof were obtained in this manner, it would still be very legitimately open to criticism from the nature of these difficulties, and moreover its place may readily be supplied. At least, I think, that the attentive observation of the successive development of the heterosporous *Uredineæ* gives us sufficient authority for believing that these are not, as is now generally supposed, *Uredines* associated in pairs, but *Uredines* furnished with a double apparatus of reproduction and capable in consequence of assuming two different forms.

Amongst these peculiar *Uredineæ*, the *Phragmidia* and *Pucciniæ* are those which have especially attracted the attention of observers. Many have thought that the spherical or oval spores which are first produced in their sori, and which now constitute various species of *Uredineæ* (*Lecytheæ s. Epiteæ* and *Trichobasis sp. recentior*), were only either the true grains of these *Phragmidia* and *Pucciniæ*, or a still imperfect state of their plurilocular fruit. The former of these opinions wrongly supposes that these pretended grains are engendered in these backward fruits, and the second requires the admission of a transformation which has not actually been proved; but both ascribe to one and the same plant the two sorts of reproductive bodies which succeed each other on the same pulvinulus (*Chirode*, Lév.). In a great number of *Pucciniæ*, fruits intermediate in form between the spherical grains or *Uredo*, and the bilocular fruits or *Puccinia*, indicate evidently that these two kinds of reproductive organs belong to one and the same Fungus. Nevertheless, notwithstanding the numerous examples of dimorphism presented by the *Phragmidia*, *Pucciniæ* and *Uromyces*, these *Uredineæ* do not perhaps prove our opinion in so satisfactory a manner as the *Coleosporia*, *Melampsoræ* and *Cronartia*.

The pulvinuli of the *Coleosporia*, Lév. (*Uredo tremellosa*, Str. *et affines*) have at first apparently all the same organization; but some of them soon become converted into spherical and pulverulent fruits

or spores, whilst others remain entire and solid, the obovate and segmented cells of which they are composed each emitting three or four long tubes terminated by large reniform spores. This second mode of fructification, which has hitherto remained unknown, is sometimes coexistent with the former in the same sori; it betrays the close affinity which unites the *Coleosporia* with the *Pucciniæ* and *Phragmidia*, and completely justifies the interpretation which we propose to give for the reproductive apparatus of all these Entophytal Fungi.

The *Melampsoræ*, Cast. (*Xylomatum sp.* Fr. S. M. ii. 261, *Sclerotiorum veterib.*) resemble the *Coleosporia* in their double structure, but differ from them in many respects. Their Uredo-pulvinuli (*Lecytheæ* and *Podosporia*, Lév. *partim*) have also an earlier development than the sori, which do not become pulverulent; the latter are formed of simple cells (unilocular) which only produce a single germ, which is terminal or basilar and usually tetrasporous, like that of the *Pucciniæ* or *Podisomata* (see my note on the germination of the *Uredineæ*, 'Comptes Rendus,' xxxvi. p. 1093). The dissemination of the spores or grains of the so-called *Uredo* takes place in summer and autumn; the spores, properly so called, of the solid pulvinuli are only produced, on the contrary, towards the end of the winter or in the beginning of spring; they are of an orange or yellow colour in *Melampsora betulina*, N., *M. populina*, Fr., *M. Tremulæ*, N., and *M. salicina*, Fr., and of a cinereous tint in *M. areolata*, Fr. The production of these late spores is a phænomenon hitherto unobserved, and proves at once that the *Melampsoræ* are certainly *Fungi*, and *Fungi* belonging to the group *Uredineæ*; two facts which have both been disputed by some mycologists.

As to the *Cronartia*, their delicate ligula is neither fistular, as is generally supposed, nor intended to carry out the propagative corpuscules of the Fungus; it is solid, and formed of cells which become seminiferous in the same manner as the chambers of a *Puccinia*, so that it must be regarded as the analogue of the ligula or columella of the *Podisomata* (see my observations on the *Tremellineæ* in the Annales des Sci. Nat. xix. p. 205). The spores with which it is covered are white and of a globose-ovoid form. Besides this complicated reproductive apparatus, which has been so misunderstood hitherto, the *Cronartia* possess another which makes its appearance earlier. The ligula in fact is usually surrounded at its base with ovoid or globular, pedicled cells, which are also evidently organs of reproduction, constituting an *Uredo* (*U. Vincetoxici*, DeC., *U. Pæoniarum*, Desm.) in the sense usually attached to this word*.

Thus the truth of the question before us will be perhaps less on the side of the philosophers than on that of the cultivators, who maintain that the *black rust* of the harvests is the second age of the *orange rust* which infests the plants in spring. According to our views, in fact, the *Puccinia graminis*, Pers., and the *P. coronata*, Cord., which form the greater part of the black rust of the Cereals, would claim, as belonging to them reciprocally, the *Uredo linearis*, Pers. and *U. Rubigo-vera*, DeC., to which the orange rust of the

* This *Uredo* would be a *Trichobasis* with M. Léveillé.

same plants in spring is also principally due. Persoon, Banks, DeCandolle and other botanists, have more or less partaken of the popular feeling to which we have just referred, but they have all explained it in such a manner as to show that the black fruits of the graminicolous *Puccinicæ* would be orange at the commencement of their development, and in this condition would have been taken for *Uredines*. None of these observers, I believe, have suspected the existence in this case of the phænomenon of dimorphism.

Now that the discoveries recently made in the history of the lower animals have shown what astonishing transformations their specific identity may undergo, these suppositions will be received, I imagine, with less prejudice, especially as they are already supported by a sufficient number of facts to remove a great deal of their apparent temerity. I have moreover great reason to hope that new observations will soon confirm them.—*Comptes Rendus*, 24th April, 1854, p. 761.

METEOROLOGICAL OBSERVATIONS FOR MAY 1854.

Chiswick.—May 1. Rain. 2. Rain: low white clouds. 3. Cloudy. 4. Very fine. 5. Foggy: very fine. 6. Cloudy: uniformly overcast: slight frost at night. 7. Fine: rain. 8. Heavy rain. 9. Showery: thunder, with heavy showers. 10, 11. Cloudy. 12. Foggy: very fine: boisterous at night. 13. Fine. 14, 15. Very fine. 16. White clouds: partially overcast: very clear: frosty. 17. Uniform haze: clear, with very dry air: overcast. 18. Uniformly overcast: clear at night: frosty. 19. Clear and fine. 20. Cloudless: very fine: clear. 21. Cloudy and fine: rain. 22. Densely clouded: rain. 23. Rain: fine: very clear. 24. Heavy showers: clear at night: frosty. 25. Fine: showers, partly hail: clear. 26. Heavy clouds: very fine: heavy rain at night. 27. Heavy rain: hail-storm, with thunder and lightning quarter to five P.M.: clear at night. 28. Fine: cloudy: showery: heavy rain. 29. Rain. 30. Overcast: rain: cloudy. 31. Very fine throughout.

Mean temperature of the month	50°·07
Mean temperature of May 1853	51 ·27
Mean temperature of May for the last twenty-eight years	53 ·85
Average amount of rain in May	1·77 inch.

Boston.—May 1. Cloudy: rain A.M. 2. Cloudy: rain A.M. and P.M. 3. Cloudy: rain P.M. 4. Fine. 5. Cloudy: rain P.M. 6. Fine. 7. Cloudy: rain, with thunder and lightning A.M. and P.M. 8. Cloudy. 9. Cloudy: rain, with thunder and lightning A.M. and P.M. 10. Cloudy. 11. Cloudy: rain A.M. 12. Fine. 13. Cloudy. 14, 15. Fine. 16. Cloudy. 17. Fine. 18. Cloudy: rain A.M. 19, 20. Fine. 21. Cloudy. 22. Cloudy: rain A.M. 23. Rain A.M. and P.M. 24. Cloudy: rain A.M. 25. Fine. 26. Cloudy: rain A.M. 27. Cloudy: rain A.M. and P.M. 28. Fine. 29. Cloudy: rain A.M. 30. Cloudy: rain A.M. and P.M. 31. Cloudy.

Sandwick Manse, Orkney.—May 1. Clear A.M.: drops P.M. 2. Clear, fine A.M.: clear P.M. 3—5. Clear and fine A.M. and P.M. 6. Clear A.M.: rain P.M. 7. Clear and fine A.M. and P.M. 8. Clear, fine A.M.: cloudy P.M. 9, 10. Bright A.M.: showers P.M. 11. Bright A.M.: cloudy P.M. 12. Cloudy A.M. and P.M. 13. Bright A.M.: showers P.M. 14. Cloudy A.M.: drizzle, showers P.M. 15. Clear A.M. and P.M. 16. Drops A.M.: damp P.M. 17. Showers A.M. and P.M. 18. Clear A.M. and P.M. 19. Cloudy A.M. and P.M. 20, 21. Showers A.M.: cloudy P.M. 22. Cloudy A.M.: drops P.M. 23. Clear A.M. and P.M. 24. Bright A.M.: clear P.M. 25. Cloudy A.M.: rain P.M. 26—30. Cloudy A.M. and P.M. 31. Damp A.M.: drizzle P.M.

Mean temperature of May for twenty-seven previous years	47°·98
Mean temperature of this month	48 ·39
Mean temperature of May 1853	49 ·07
Average quantity of rain in May for thirteen previous years	1·68 inch.